

## REMARKS

Claims 1,2 and 9-27 are pending in the current application. The Office Action has determined Claims 9-24 contain allowable subject matter and has rejected Claims 1, 2 and 25-27. The Office Action has also objected to the disclosure.

### I. Claim rejections

With regard to the prior art rejections, the Office Action has generally misapplied the cited art by incorrectly equating “face finding” with “face recognition” which on its face is improper.

#### (a) 35 U.S.C. § 103(a)

The Office Action rejected Claims 1, 2, 25-27 as being unpatentable over Face recognition using the HAVNET neural network, by Altaf et al. The Applicant asserts the rejection is improper.

Claim 1 recites:

“A method of **finding a face** in a binarized image by comparing the dot group of the binarized image with the dot group of a face model, the face model being subjected to multiple two-dimensional transforms in order to locate the face model in the binarized image, and the dot groups of the binarized image and the face model being compared on the basis of the Hausdorff spacing between the dots of the dot groups and a position of a face in the binarized image is found when a measure derived from the Hausdorff spacing fails to reach a limit value.”[emphasis added]

The article by Altaf et al. (HAVNET article) relates to a face recognition system in which the Hausdorff distance is used for comparing two faces, i.e. for face recognition, not to face finding. Finding or localizing of a face is not dealt with in the HAVNET article. In fact, at the time when the article was published, face finding was thought to be a task virtually impossible to solve; in the method of face recognition described in HAVNET an image contains only the face to be recognized.

The Applicant's assertion is further evidenced by the Office Action's statement that "Altaf discloses a face recognition system" which is in contrast to a method of face finding in the present claims. Furthermore HAVNET describes that the face image is captured to produce a pixelated image of the face. HAVNET section 2.1 states:

"The camera and card combination is used to capture face images and produces 640x480 pixel raw images in 0-255 grey-scale format."

Thus it is clear that the method described in HAVNET starts where the face image has already been found. This is further demonstrated in the experiments detailed in sections 5.1 -5.3 where the whole images are compared to like whole images in order to find matches. There is no face finding or localizing evident in the experiments.

Claim 1 defines "*a method of finding a face in a binarized image*" and "*the face model being subjected to multiple two dimensional transforms in order to locate the face model in the binarised image*" wherein "*a position of a face in the binarized image is found when a measure derived from the Hausdorff spacing fails to reach a limit value*". The HAVNET article deals with recognizing human faces by extracting edges and vertices from the image, grouping these extracted edges and vertices and learning or recognizing the image. The learning process is done by training a node on each aspect that varies to a certain degree from already trained nodes. The recognition process is performed by measuring the distance between an input pattern and the learned patterns, i.e. by comparing the input pattern with already known patterns.

The HAVNET article does not disclose or suggest, nor even envision that the Hausdorff algorithm could be used for finding or locating a face in a binarized image, i.e. a step which has to be performed before face recognition and face learning can be done.

Additionally, there are further differences between the present invention and the HAVNET article. For example the invention described by the present claim, the Hausdorff model is scaled, translated and rotated, whereas in the HAVNET article polar coordinate transformation is performed on the whole image and not on a face model. HAVNET recites :

"The center of an entity is found before its vertices are converted into polar coordinates. the result is a normalized entity that is

digitized into a 64x64 grid. Then, the resulting grid is rotated shifted in  $\theta$  dimension until the primary axis is located. This invariant 64x64 binary grid which represents the acquired image is passed to the higher vision stage of CAMERA which consists of a novel neural network architecture designed specifically for three dimensional object recognition.”

Accordingly, the HAVNET article does not disclose that “*the face model is subjected to multiple two-dimensional transforms in order to locate the face model in the binarized image*” as recited in the claims.

The Office Action has the comparison is done on the basis of the Hausdorff spacing. Calculating the Hausdorff distance is used in the prior art for recognizing a face and for fast searching a database containing face images. However, HAVNET does not as recited in claim 1, use “*Hausdorff spacing between the dots of the dot groups and a position of a face in the binarized image is found when a measure derived from the Hausdorff spacing fails to reach a limit value.*” The only disclosure in HAVNET is the use of Hausdorff Voronor NET work which uses Hausdorff distance as a metric of similarity between patterns, not dots or face position. Using the Hausdorff distance for localizing a face in an image is simply not envisioned or suggested in the prior art.

The Office Action admits that HAVNET does not disclose the dot group of the image. The Office Action states that since the image acquisition is done by a camera that produces 640x480 pixels this is obvious to one ordinary skilled in the art at the time of the invention to simply use the pixel image as the “dot group” as claimed. It is apparent that the Office Action again is equating two distinct entities. As shown above the image acquisition done by the camera produces a gray scale image, which is fundamentally different from a dot image, as seen in figures 1 and 2 respectively in the current specification.

The Office Action has failed to establish a prima facie case of obviousness. The cited art does not include a method of face finding, does not use a face model to find a face, does not subject the face model to multiple two-dimensional transforms in order to locate the face model in the binarized image, and the dot groups of the binarized image, does not disclose using dot images, does not use Hausdorff spacing between the dots of the groups and does not locate the position of a face when the Hausdorff spacing fails to reach a limit value. The cited art does not

even recognize the problem of face finding. Therefore, HAVNET does not show, teach, or suggest the invention as described in Claim 1 and thus cannot render Claim 1 unpatentable.

Claims 2, 9-27 depend from Claim 1 and therefore, the likewise cannot be obvious over HAVNET.

The Applicant request withdrawal of the rejections of Claims 1, 2, 25-27.

**(b) 35 U.S.C § 112 2<sup>nd</sup> paragraph**

The Office Action rejected Claims 13, 15, 21 and 23 as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

The Applicant has amended the Claims 13 and 15 to obviate the Office Actions rejections and request withdrawal of the rejection.

**II. Specification Objections**

The disclosure on page 4, paragraph 2, line 2 has been amended to obviate the Office Action objections.

**III. Claim Objections**

The Claims as amended obviate the Office Actions objections.

**IV. Arrangement of the specification**

The Office Action has provided the guidelines illustrating the preferred layout for the specification of a utility application. While the applicant appreciates the suggestion of use of the guidelines, the applicant also recognizes that they are only guidelines and not required. The Applicant at this time chooses not to follow the guidelines.

**CONCLUSION**

The Applicant has amended the claims to render the claim objections and the rejection under 35 U.S.C. §112 2<sup>nd</sup> paragraph moot.

The Applicant has provided remarks demonstrating that the method of "face recognition" described in HAVNET cannot render the method of "face finding" as described in the present claims unpatentable.

The prior art does not disclose a method of face finding.

The prior art does not disclose multiple two-dimensional transforms of the face model.

The prior art does not disclose localizing the face model in the binarized image.

The prior art does not disclose that a position of a face in the binarized image is found when a measure derived from the Hausdorff spacing fails to reach a limit value.

The Applicant requests withdrawal of the claim rejections, claim objection and specification objections, and further requests allowance of the application including Claims 1, 2, 9-27.

Respectfully submitted,



Mark C. Comtois	Reg. No. 46,285
L. Lawton Rogers, III	Reg. No. 24,302
D. Joseph English	Reg. No. 42,514
Patrick D. McPherson	Reg. No. 46,255

DUANE MORRIS LLP  
1667 K Street, N.W., Suite 700  
Washington, DC 20006  
Telephone: (202) 776-7800  
Telecopier: (202) 776-7801

Dated: October 13, 2004

WSH\119540.1